

Association between risky dietary behaviors and academic achievement among adolescent girls: a cross-sectional study in Surabaya, Indonesia

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ABSTRACT

Risky dieting is an unbalanced eating pattern increasingly practiced by adolescent girls and has the potential to impact cognitive function and academic achievement. However, previous research has focused more on the impact of risky dieting on nutritional status and physical health, while empirical evidence regarding its relationship with academic achievement in adolescent girls is still limited, particularly in the context of higher education. This study aimed to analyze the relationship between risky dieting and academic achievement in adolescent girls. The study used a quantitative design involving 70 adolescent girls. Data were collected through a peer counselor-based questionnaire to measure risky dietary habits and academic achievement. Data analysis was performed using Fisher's exact test. The results showed p-values of 0.05 and 0.023, respectively, indicating a significant relationship between risky dieting and academic achievement. Adolescent girls who engaged in risky dieting tended to have lower semester GPAs (11%) and cumulative GPAs (4%). The study concluded that risky dieting contributes to decreased academic achievement. This study contributes by expanding empirical evidence regarding the impact of risky dieting on academic achievement and emphasizes the importance of integrating nutrition interventions and health education in strategies to improve academic achievement in adolescent girls.

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1. INTRODUCTION

Adolescent health is a key determinant of educational success and long-term productivity. During this phase, adolescent girls are increasingly vulnerable to risky dietary patterns, such as extreme dietary restrictions and high consumption of fast food [1]. An unhealthy diet can affect cognitive function, which ultimately has the potential to reduce academic achievement [2]. The increasingly unbalanced dietary patterns of adolescents raise concerns about their impact on academic achievement, necessitating further study of the relationship between risky diets and academic achievement in adolescent girls. A study in China showed that a high-protein diet was associated with improved cognitive performance, while a high-fat diet was associated with decreased cognitive performance [3]. A study in Santiago, Chile, found that consumption of unhealthy snacks in the

school environment was associated with lower academic achievement compared to students who consumed healthy snacks [4]. Despite these insights, important questions remain unanswered. Most of these studies were conducted in high-income countries and focused on single nutritional indicators, such as dietary habits or consumption of specific foods, without comprehensively examining at-risk dietary patterns.

Meanwhile, in Indonesia, a study of the breakfast habits of eighty female students in Surakarta found that 47.5% of the students were not used to having breakfast in the morning [5]. The Global School-Based Health Survey involving more than 2,800 participants revealed that 75.2% of adolescents in Indonesia consumed less than five servings of fruits and vegetables per day in the past 30 days [6]. In addition, a prospective cohort study in Bogor found that sweet drinks were the second most consumed type of drink by adolescents after water, with consumption levels higher among female adolescents than male adolescents [7]. Teenagers' preferences for fast food such as pizza, fried chicken, French fries, and donuts were reported in a study in Cirebon [8]. Although numerous studies have shown the high risk of unhealthy eating patterns, they have focused solely on poor breakfast habits, nutritional status, and food choices, without considering their impact on academic achievement in an integrated manner, particularly in adolescent girls. This lack of local evidence complicates the development of evidence-based nutrition interventions that are relevant to socio-cultural and economic conditions.

This study was designed to address this gap. This is the first study to examine the relationship between risky diets and academic achievement among Indonesian adolescents, particularly in the college environment. We conducted a cross-sectional survey of adolescent girls to measure dietary risk and academic achievement. Unlike previous studies, this study focused specifically on risky diets, rather than just general diet quality or specific nutrient intakes. The findings of this study provide an evidence base for the development of school-based adolescent health education programs and nutrition interventions, as well as support the formulation of integrated public health and education policies. Efforts to control risky diets are expected to improve adolescent health status and their academic achievement. Healthy adolescents are more likely to learn optimally. An increase in the academic achievement index will also improve the outcomes of college graduates. Ultimately, this will produce high-quality human resources as part of national development.

2. METHOD

The study used an analytical survey design with a cross-sectional approach to identify the relationship between risky diets and academic achievement. This study was conducted in Surabaya, East Java, at the Sutomo Midwifery Campus of Polkesbaya Surabaya from July to October 2023. This study was approved by the Ethics Commission of the Surabaya Ministry of Health Polytechnic of Health with Ethics Certificate Number: No.EA/2285/KEPK Poltekkes_Sby/V/2024. However, the issuance of ethical approval was carried out after going through an institutional ethical and administrative review process. All research procedures were carried out in accordance with ethical principles of health research, including providing informed consent, protecting data confidentiality, and ensuring patient rights and safety.

2.1. Variable

The independent variable in this study was academic achievement, while the dependent variable was risky diet. The study population consisted of 117 female adolescents in the second semester of the Sutomo Midwifery Study Program. The sample size was determined using the Slovin formula, with a significance level of 0.05, and a 7x5 to 7x10 arrow path analysis, resulting in 70 respondents. Inclusion criteria included female adolescents aged 18–22 years, active third-semester students, with a minimum attendance rate of 75%, and willingness to participate in the study by signing an informed consent. Exclusion criteria included respondents with physical or mental health disorders and those who were absent during data collection. The sampling technique used random sampling to ensure that each member of the population had an equal opportunity and minimize selection bias.

2.2. Data collection

Data collection was conducted using a peer counselor-based questionnaire with the assistance of student enumerators to facilitate respondents who had difficulty filling out the questionnaire and to minimize dishonest responses. Sociodemographic data were collected, including the age and basic characteristics of the respondents, through six supporting questions. The measurement tool used a questionnaire with a four-point Likert scale (always, often, sometimes, never). Testing the validity of the 25 questions using item-total correlation and reliability tested with Cronbach's Alpha obtained 0.95.

2.3. Data analysis

Descriptive statistical techniques to summarize sample characteristics. Inferential statistics for analysis using Fisher's Exact Test with a significance level of $p < 0.05$ and a 95% confidence interval (CI), to test the relationship between variables. Data processing using statistical package for social studies (SPSS) version 26.

3. RESULTS AND DISCUSSION

Teenagers who diet are at risk of serious health problems and the consequences of reduced academic performance [9]. Despite being aware of the negative impacts, many continue to try to achieve the ideal body satisfaction they desire, which has the potential to change their lives [10]. The prevalence of adolescents who engaged in risky diets was 81.4%, and only 18.6% who did not, as seen in Table 1.

Table 2. This indicates that most respondents were between the ages of 18 and 19 (80%), while the remaining 20% were between the ages of 20 and 21. This indicates that almost all respondents were in the transition period from childhood to adulthood [11]. Currently, a balanced nutritional food intake is needed as an important process in the body [12]. When food intake does not meet daily nutritional needs, a nutritional imbalance occurs (nutrient deficiency or excess) [13]. Based on body mass index (BMI), most respondents had a BMI overweight (40%), a normal BMI (40%), and a BMI underweight (20%). This finding indicates a tendency towards multiple nutritional problems in adolescents, particularly overweight [14]. Although very few respondents admitted to their peer counselors that they felt insecure about being overweight, the researchers' findings may support the reasons why teenagers engage in risky dieting [15]. A study in Semarang Regency stated that a small number of teenagers are overweight and very few are obese [16], [17]. These findings confirm that unbalanced dietary patterns, whether excessive or extreme, risk disrupting adolescents' nutritional balance [18].

In terms of residence, most respondents live alone or in boarding houses (58.6%), while 40% live with their parents, and a small proportion (1.4%) live with their grandparents. This situation has the potential to influence their daily eating patterns and food choices due to a lack of parental supervision [19]. So behaviorally, they choose irregular meal schedules, lack of physical activity, and low nutritional literacy, which collectively worsen learning readiness [20]. Researchers found that most adolescents answered "never" in the questionnaire asking "Do you do moderate exercise every day (jogging, cycling, aerobics)?" This proves the lack of physical activity among adolescents. From a socioeconomic perspective, the majority of respondents' parents' incomes were below the minimum wage (UMR) (42.9%), followed by incomes according to the minimum wage (32.9%) and above the minimum wage (24.2%), which can have implications for access to and quality of food intake. Furthermore, most respondents (84.3%) had close friends or best friends, indicating the strong influence of the social environment during adolescence. Analysis of the Lifelines cohort in the Netherlands shows that an individual's dietary patterns closely reflect the eating patterns of those closest to them, especially their spouse [21]. This may be driven by changing social norms, increased marketing efforts targeting teenage girls, and the perception that dieting to be beautiful [22]. In terms of eating habits, more than half of respondents frequently eat home-cooked meals (55.7%), but the proportion consuming fast food or junk food is also quite high (44.3%). A recent study of children and adolescents in the United States showed that a large portion of their energy, sugar, sodium, and saturated fat intake comes from fast food consumption [23]. Food preferences showed that respondents preferred dry food without vegetables (51.4%) over food with vegetables (48.6%), even though vegetables are rich in iron. A German study confirmed that vegetables, which readily absorb iron, help supplement other iron intake (meat, supplements) [24]. Other literature states that even mushrooms and seaweed (nori) are high in iron and vitamin B12, where if these two substances are not met, it can reduce concentration and memory [25]. Additionally, more than half of respondents (58.6%) preferred foods containing monosodium glutamate (MSG). Choosing fast food high in MSG can increase the risk of brain fog, headaches, and fatigue [26]. In addition, it can trigger energy instability and mental fatigue, which impacts concentration and then reduces focus when studying [27].

Table 1. Frequency distribution of risky diets in adolescents (n = 70)

Category	Frequency	(%)
Risk	57	81.4
No risk	13	18.6

Table 2. Frequency distribution of sociodemographic conditions in adolescents (n = 70)

Characteristics		Frequency	(%)	Characteristics		Frequency	(%)
Age	18-19	56	80	Stay	Parents	28	40
	20-21	14	20		Grandmother/grandfather	1	1.4
IMT	Less	14	20	What to eat often	Alone/boarding	41	58.6
	Normal	28	40		Home cooking	39	55.7
	More	28	40		Fast food/junk food	31	44.3
Have close friends/best friends	Yes	59	84.3	What do you like to eat?	Dry without vegetables	36	51.4
	No	11	15.7		With vegetables	34	48.6
Parent's income level	Under UMR	30	42.9	Like food with MSG	Like	41	58.6
	According UMR	23	32.9		Don't like	29	41.4
	More than UMR	17	24.2				

Based on Table 3, almost all respondents who were not at risk had a good semester grade point average (GPA), with 59 people (84%). Meanwhile, the at-risk group only numbered 11 people (16%). Similar results were found for the cumulative GPA, with the non-risk group dominating with 66 people (94%). Meanwhile, there were only 4 people (6%) in the at-risk group. The statistical test results showed a P value of 0.05 and 0.023, indicating a significant relationship between risky dietary behavior and academic achievement (GPA and GPA). This relationship can be explained by several biological and behavioral mechanisms. Extreme dietary restrictions and the habit of skipping breakfast have the potential to reduce the availability of glucose as the brain's primary energy source, thereby disrupting cognitive functions such as working memory, attention, and information processing speed [28], [29]. The issue of breakfast is still a challenge for teenagers. Laziness and staying home are significantly associated with skipping breakfast. Teenagers who regularly eat breakfast have higher short-term memory and concentration scores than those who skip breakfast [30]. Australian cohort study of the role of breakfast consumption and quality in motivating students in science test performance [31]. The extreme diets these teenagers embarked on were not monitored by nutritionists or doctors; almost all of them followed their own rules. These findings strengthen evidence that academic achievement is influenced not only by cognitive factors and the learning environment, but also by fundamental daily health behaviors. The dietary restrictions mentioned above extend beyond skipping breakfast to skipping rice altogether, often just side dishes [32], [33]. Several sources mention numerous diet methods in Indonesia, information about which can be accessed through social media. These include low-carb diets, high-protein diets, intermittent fasting, very low-calorie diets, skip-meal diets, snack-based diets, and others [34], [35]. However, teenagers should consult with experts so that they do not fall into the category of risky diets.

This study extends the international literature by providing evidence from middle-income countries, which have distinct sociocultural characteristics and consumption patterns from developed countries. Interventions should not simply emphasize increasing specific nutrient intakes but should target changes in risky dietary behaviors across the board, including breakfast habits, food choices, and body image perceptions. School-based nutrition education programs can be integrated with psychosocial counseling services to address social pressures related to ideal body image that encourage extreme dieting. Furthermore, the high proportion of adolescents living alone or in boarding houses suggests the need for interventions tailored to adolescent independence, such as providing practical and affordable meal guides. From a policy perspective, the results of this study support strengthening the school health program (UKS), regulating school and campus canteens, and public health campaigns that directly link healthy eating behaviors to academic success. Parents and the community play a crucial role in shaping adolescents' perceptions of diet and body image. Support in the form of providing nutritious food according to needs and avoiding judgments based on body shape is necessary. Counseling on positive body image is also crucial to prevent excessive dieting and nutritional disorders in adolescents.

Table 3. Results of fisher's test for risky diets on IPS and GPA scores (n = 70)

Variable risky diet	Achievement academic		N	(%)	p-value
	Very satisfying (≥ 3.50)	Praise (≥ 3.75)			
Risk (IPS)	3	8	11	16	0.05
No risk (IPS)	6	53	59	84	
Risk (IPK)	1	3	4	6	0.023
No risk (IPK)	3	63	66	94	

4. CONCLUSION

This study confirms that risky diets in adolescent girls aged 18–22, characterized by self-managed diets without consulting a health professional, consumption of soda and MSG, lack of physical activity, peer influence, and family economic backgrounds below the minimum wage, are associated with decreased academic achievement. These findings advance knowledge by expanding empirical evidence that risky diets impact not only physical health but also cognitive function and academic performance in adolescent girls, a group that has received little attention in academic nutrition research. The results of this study provide a scientific basis for the development of school- and college-based nutrition programs, through balanced nutrition education, strengthening the role of peer counselors, and parental involvement in developing healthy eating behaviors. Furthermore, these findings are relevant for public health initiatives and can be integrated into national adolescent health policy programs as a multidimensional preventive measure. However, limitations such as the cross-sectional design, self-reported data, and the lack of control for confounding factors emphasize the need for further research with longitudinal designs, cross-regional and socioeconomic approaches, and nutrition interventions accompanied by monitoring of academic achievement.

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